

VariFlex²

RVCF series

Quick Start Guide

230V	Class 1ph or 3ph	0.4~30.0kW 0.5~40HP
480V	Class 3ph	0.75~55kW 1.0~75HP



General Information

The manufacturer accepts no liability for any consequences resulting from inappropriate, negligent or incorrect installation or adjustment of the optional parameters of the equipment or from mismatching the variable speed drive with the motor.

The contents of this guide are believed to be correct at the time of printing. In the interests of commitment to a policy of continuous development and improvement, the manufacturer reserves the right to change the specification of the product or its performance, or the content of the guide without notice.

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Drive Software Version

This product is supplied with the latest version of user-interface and machine control software. If this product is to be used in a new or existing system with other drives, there may be some differences between their software and the software in this product. These differences may cause the product to function differently. This may also apply to drives returned from the Carlo Gavazzi Service Centre. If there is any doubt, please contact your local Carlo Gavazzi representative or Distributor.

Environmental Statement

The electronic variable speed drives have the potential to save energy and (through increased machine/process efficiency) reduce raw material consumption and scrap throughout their long working lifetime. In typical applications, these positive environmental effects far outweigh the negative impacts of product manufacture and end-of-life disposal.

Nevertheless, when the products eventually reach the end of their useful life, they can very easily be dismantled into their major component parts for efficient recycling. Many parts snap together and can be separated without the use of tools, while other parts are secured with conventional screws.

Virtually all parts of the product are suitable for recycling.

Product packaging is of good quality and can be re-used. All the products come in strong cardboard cartons which themselves have a high recycled fibre content. If not re-used, these containers can be recycled. Polythene, used on the protective film and bags from wrapping product, can be recycled in the same way. Carlo Gavazzi' packaging strategy favours easily recyclable materials of low environmental impact, and regular reviews identify opportunities for improvement.

When preparing to recycle or dispose of any product or packaging, please observe local legislation and best practice.

Quick Start Guide

This guide is to assist in installing and running the inverter to verify that the drive and motor are working properly. Starting, stopping and speed control will be from the keypad. If your application requires external control or special system programming, consult the RVCF Advanced User Manual supplied with the CD in your inverter .

Step 0 Products Inspection

Carlo Gavazzi's inverters are all passed the function test before delivery. Please check the followings when you received and unpacked the inverter:

- The model and capacity of the inverter are the same as those specified in your purchase order.
- Check where there are any damages caused by transportation. Please do not apply the power, and do contact Carlo Gavazzi's sales representatives if any of the above problems happened.

Step 1 Before Starting the Inverter

Please review Preface and Safety Precautions of the RVCF Instruction Manual. Verify drive was installed in accordance with the procedures as described in RVCF Ambient Environment and Installation. If you feel this was abnormal, do not start the drive until qualified personnel have corrected the situation. (Failure to do so could result in serious injury.)

- **Check inverter and motor nameplates to determine that they have the same HP and voltage ratings. (Ensure that full load motor amps do not exceed that of the inverter.)**
- **Remove the terminal cover to expose the motor and power terminals.**
 - Verify that AC power is wired to L1, L2, and L3.**
 - Verify that Motor leads are connected to T1, T2, and T3.**
(The two leads may need to be reversed if motor rotation is not correct).



- 1. SEQ LED :** 1_00 =1, LED Lit.
- 2. FRQ LED :** 1_06 = 1/2/3/4, LED Lit
- 3. FWD LED:** Forward Direction, LED action(Flash in stop, Keep Lit in operation).
- 4. REV LED :** Reverse Direction, LED action(Flash in stop, Keep Lit in operation).
- 5. Four action of FUN, Hz/RPM, VOLT, AMP LED and display of four 7-segment display,** refer

to operation description of the keypad.

6. LCD keypad without FUN, Hz/RPM, VOLT, AMP LED.

Step 2 Apply Power to the Drive

- Apply AC power to the Drive and observe Operator. Four 7-segment Display should read Power Voltage for 3~5 seconds and then read Frequency/Speed, 05.00. Four 7-segment Display and FWD LED should be flashed all the time.

Step 3 Check Motor Rotation Without Load

- Press RUN key (FWD LED should light); Four 7-segment Display should run from 00.00 to 05.00.
- Check motor rotation. If it is not correct:
 - Press STOP key. Remove AC power. Wait for LED “charge” lamp to extinguish.
 - Reverse motor leads T1 and T2. Restart the drive and check new rotation.
- Press STOP key to stop the drive.

Step 4 Check Full Speed at 50Hz/60Hz

- Frequency/Speed can be changed by pressing the up or down Arrow keys. To move right or left for next digit, press SHIFT / RESET key. Press the READ / ENTER key to set the speed.
- Set frequency up to 50Hz/60Hz in accordance with the last rule.
- Press RUN key. Check drive acceleration to full speed.
- Press STOP key to stop drive and check deceleration.

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Introduction

i.1 Model description

Inverter model

Input power

Output power



CAUTION

Do not inspect components unless the lamp is off
See manual for proper installation and operation.

Model	: RVCFB3400220
Motor Rating	: 3HP/2.2kW

INPUT	: AC 3 phases 50/60Hz
VOLTAGE	: 380~480V (+10%, -15%)
Amps	: 7.3A

OUTPUT	: AC 3 phases 0~650Hz
VOLTAGE	: 0~480V
Amps	: 5.2A

IP20 / UL Open-Type with shielding cover removed
(rated -10°C to 50°C Ambient)
NEMA 1/UL Type 1 with shielding cover and optional
conduit box kit installed (rated -10°C to 40°C Ambient)



LISTED 16KJ
POWER CONV. EQ.
E319186





CARLO GAVAZZI

Carlo Gavazzi Logistics

Via Milano 13, IT-20020 Lainate (MI)
MADE IN CHINA

Ordering Key

RVCF B 3 40 0220 F
VariFlex² AC Drive

Frame Size

AC Supply Phase

Drive Voltage Rating

Drive kW Rating

Option

i.2 Type Selection

Series	Frame Size	AC Supply Phase	Drive Voltage Rating	Drive kW Rating	Option
RVCF	A: Size1	1: 1-Phase	20: 230VAC	0040: 0.40kW, 0.50 HP	Nil: Without Options
	B: Size2	3: 3-Phase	40: 480VAC	0075: 0.75kW, 1.0 HP	F: Built-in filter
	C: Size3			0150: 1.5kW, 2.0 HP	
	D: Size4			0220: 2.2kW, 3.0 HP	
	E: Size5			0370: 3.70kW, 5HP	
	F: Size6			0550: 5.50kW, 7.5HP	
				0750: 7.50kW, 10HP	
				1100: 11.0kW, 15HP	
				1500: 15.0kW, 20HP	
				1850: 18.5kW, 25HP	
				2200: 22.0kW, 30HP	
				3000: 30.0kW, 40HP	
				3700: 37.0kW, 50HP	
				4500: 45.0kW, 60HP	
				5500: 55.0kW, 75HP	

i.3 Electrical Safety - general warning

The voltages used in the drive can cause severe electrical shock and/or burns, and could be lethal. Extreme care is necessary at all times when working with or adjacent to the drive. Specific warnings are given at the relevant places in this guide.

i.4 System design and safety of personnel

The drive is intended as a component for professional incorporation into complete equipment or system. If installed incorrectly, the drive may present a safety hazard.

The drive uses high voltages and currents, carries a high level of stored electrical energy, and is used to control equipment which can cause injury.

System design, installation, commissioning and maintenance must be carried out by personnel who have the necessary training and experience. They must read this safety information and this guide carefully.

The STOP and START controls or electrical inputs of the drive must not be relied upon to ensure safety of personnel. They do not isolate dangerous voltages from the output of the drive or from any external option unit. The supply must be disconnected by an approved electrical isolation device before gaining access to the electrical connections.

The drive is not intended to be used for safety-related functions.

Careful consideration must be given to the function of the drive which might result in

a hazard, either through its intended behaviour or through incorrect operation due to a fault. In any application where a malfunction of the drive or its control system could lead to or allow damage, loss or injury, a risk analysis must be carried out, and where necessary, further measures taken to reduce the risk - for example, an over-speed protection device in case of failure of the speed control, or a fail-safe mechanical brake in case of loss of motor braking.

i.5 Environmental Limits

Instructions within the supplied data and information within the *VariFlex² Advanced User Manual* regarding transport, storage, installation and the use of the drive must be complied with, including the specified environmental limits. Drives must not be subjected to excessive physical force.

i.6 Access

Access must be restricted to authorised personnel only. Safety regulations which apply at the place of use must be complied with.

The IP (Ingress Protection) rating of the drive is installation dependant. For further information, refer to the *VariFlex² Advanced User Manual*.

i.7 Compliance and regulations

The installer is responsible for complying with all relevant regulations, such as national wiring regulations, accident prevention regulations and electromagnetic compatibility (EMC) regulations. Particular attention must be given to the cross-sectional areas of conductors, the selection of fuses and other protection, and protective earth (ground) connections.

The *VariFlex² Advanced User Manual* contains instructions for achieving compliance with specific EMC standards.

Within the European Union, all machinery in which this product is used must comply with the following directives:

98/37/EC: Safety of machinery

89/336/EEC: Electromagnetic compatibility

i.8 Motor

Ensure the motor is installed in accordance with the manufacturer's recommendations.

Ensure the motor shaft is not exposed. Standard squirrel cage induction motors are designed for single speed operation. If it is intended to use the capability of a drive to run a motor at speeds above its designed maximum, it is strongly recommended that the manufacturer is consulted first.

Low speeds may cause the motor to overheat because the cooling fan becomes less effective. The motor should be fitted with a protection thermistor. If necessary, an electric force vent fan should be used. The values of the motor parameters set in the drive affect the protection of the motor. The default values in the drive should not be relied upon. It is essential that the correct value is entered into parameter concerning the motor rated current. This affects the thermal protection of the motor.

i.9 Adjusting parameters

Some parameters have a profound effect on the operation of the drive. They must not be altered without careful consideration of the impact on the controlled system.

Measures must be taken to prevent unwanted changes due to error or tampering.

i.10 Electrical installation

i.10.1 Electric shock risk

The voltages present in the following locations can cause severe electric shock and may be lethal:

- AC supply cables and connections
- DC bus, dynamic brake cables and connections
- Output cables and connections
- Many internal parts of the drive, and external option units

Unless otherwise indicated, control terminals are single insulated and must not be touched.

i.10.2 Isolation device

The AC supply must be disconnected from the drive using an approved isolation device before any cover is removed from the drive or before any servicing work is performed.

i.10.3 STOP function

The STOP function does not remove dangerous voltages from the drive, the motor or any external option units.

i.10.4 Stored charge

The drive contains capacitors that remain charged to a potentially lethal voltage after the AC supply has been disconnected. If the drive has been energised, the AC supply must be isolated at least ten minutes before work may continue.

Normally, the capacitors are discharged by an internal resistor. Under certain, unusual fault conditions, it is possible that the capacitors may fail to discharge, or be prevented from being discharged by a voltage applied to the output terminals. If the drive has failed in a manner that causes the display to go blank immediately, it is possible the capacitors

will not be discharged. In this case, consult Carlo Gavazzi or their authorised distributor.

i.10.5 Equipment supplied by plug and socket

Special attention must be given if the drive is installed in equipment which is connected to the AC supply by a plug and socket. The AC supply terminals of the drive are connected to the internal capacitors through rectifier diodes which are not intended to give safety isolation. If the plug terminals can be touched when the plug is disconnected from the socket, a means of automatically isolating the plug from the drive must be used (e.g. a latching relay).

i.10.6 Ground leakage current

The drive is supplied without or with an internal EMC filter capacitor fitted. If the input voltage to the drive is supplied through an ELCB or RCD, these may trip due to the ground leakage current. Please refer to *VariFlex² Advanced User Manual* for further information and how to connect correctly the EMC capacitor.

Chapter 1 Notice for Wiring

1.1 Fuse types

Drive input fuses are provided to disconnect the drive from power in the event that a component fails in the drive's power circuitry. The drive's electronic protection circuitry is designed to clear drive output short circuits and ground faults without blowing the drive input fuses. Below table shows the RVCF input fuse ratings.

To protect the inverter most effectively, use fuses with current-limit function.

RK5, CC/T TYPE FUSE FOR RVCF

230V class(1φ)

MODEL	HP	KW	KVA	100% CONT Output AMPS (A)	Max.RK5 FUSE Rating(A)	Max.CC or T FUSE Rating(A)
RVCF A1200040	0.5	0.4	1.2	3.1	10	20
RVCF A1200075	1	0.75	1.7	4.5	15	30
RVCF B1200150	2	1.5	2.9	7.5	20	40
RVCF B1200220	3	2.2	4.0	10.5	25	50

230V class(3φ)

MODEL	HP	KW	KVA	100% CONT Output AMPS (A)	Max.RK5 FUSE Rating(A)	Max.CC or T FUSE Rating(A)
RVCF A3200040	0.5	0.4	1.2	3.1	8	10
RVCF A3200075	1	0.75	1.7	4.5	12	15
RVCF A3200150	2	1.5	2.9	7.5	15	20
RVCF B3200220	3	2.2	4.0	10.5	20	30
RVCF B3200370	5	3.7	6.7	17.5	30	50
RVCF C3200550	7.5	5.5	9.9	26	50	60
RVCF C3200750	10	7.5	13.3	35	60	70
RVCF D3201100	15	11.0	20.6	48	80	100
RVCF D3201500	20	15.0	27.4	64	100	125
RVCF D3201850	25	18.5	34.0	80	125	150
RVCF E3202200	30	22.0	41.0	96	160	200
RVCF E3203000	40	30.0	54.0	130	200	250

480V class(3φ)

MODEL	HP	KW	KVA	100% CONT Output AMPS (A)	Max.RK5 FUSE Rating(A)	Max.CC or T FUSE Rating(A)
RVCF A3400075	1	0.75	1.7	2.3	6	10
RVCF A3400150	2	1.5	2.9	3.8	10	15
RVCF B3400220	3	2.2	4.0	5.2	10	20
RVCF B3400370	5	3.7	6.7	8.8	20	30
RVCF C3400550	7.5	5.5	9.9	13	25	35
RVCF C3400750	10	7.5	13.3	17.5	30	50
RVCF C3401100	15	11.0	20.6	25	50	60
RVCF D3401500	20	15.0	27.4	32	60	70
RVCF D3401850	25	18.5	34.0	40	70	80
RVCF D3402200	30	22.0	41.0	48	80	100
RVCF E3403000	40	30.0	54.0	64	100	125
RVCF E3403700	50	37.0	68.0	80	125	150
RVCF F3404500	60	45.0	82.0	96	150	200
RVCF F3405500	75	55.0	110.0	128	200	250

*Fuse ratings are based upon 300V fuses for 230V inverter, and 500V for 480V inverters

☐ Notice

- To avoid shock hazards, do not touch any electrical component when the power is applied or just after five minutes the power plug is unplugged. The other action should be performed after the charge indicator went off.
- Do not perform wiring on the inverter while it is still electrified. Disregard of this notice could cause serious injure or death to persons.

☐ This product is designed to use in Pollution Degree 2 environment or equivalent environments.

1.2 Precautions for peripheral applications:

Power supply:

- Make sure the voltage applied is correct to avoid damaging the inverter.
- A molded-case circuit breaker must be installed between the AC source and the inverter.

Molded-case circuit breaker:

- Use a molded-case circuit breaker that conforms to the rated voltage and current of the inverter to control the power ON/OFF and protect the inverter.
- Do not use the inverter as the switch for run/stop switch.

Leakage breaker:

- Install a leakage breaker to prevent error operation caused by electric leakage and to protect operators.
- Setting current should be 200mA or above and the operating time at 0.1 second or longer to prevent malfunction.

Magnetic contactor:

- Normal operations do not need a magnetic contactor. But a contactor has to be installed in primary side when performing functions such as external control and auto restart after power failure, or when using brake controller.
- Do not use the magnetic contactor as the run/stop switch of the inverter.

AC reactor for power improvement:

- When inverters below 230V/480V 15KW are supplied with high capacity (above 600KVA) power source or an AC reactor can be connected to improve the power performance.

Install fast action fuse:

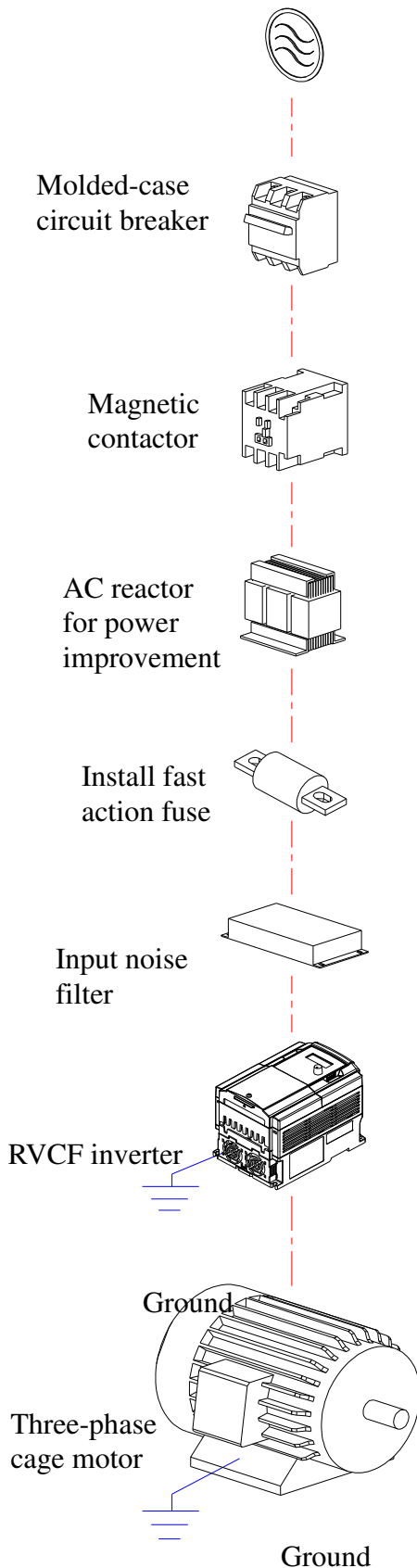
- To ensure the safety of peripheral devices, please install the fast action fuse. Regarding the specification, please refer to P3-4.

Input noise filter:

- A filter must be installed when there are inductive load around the inverter.

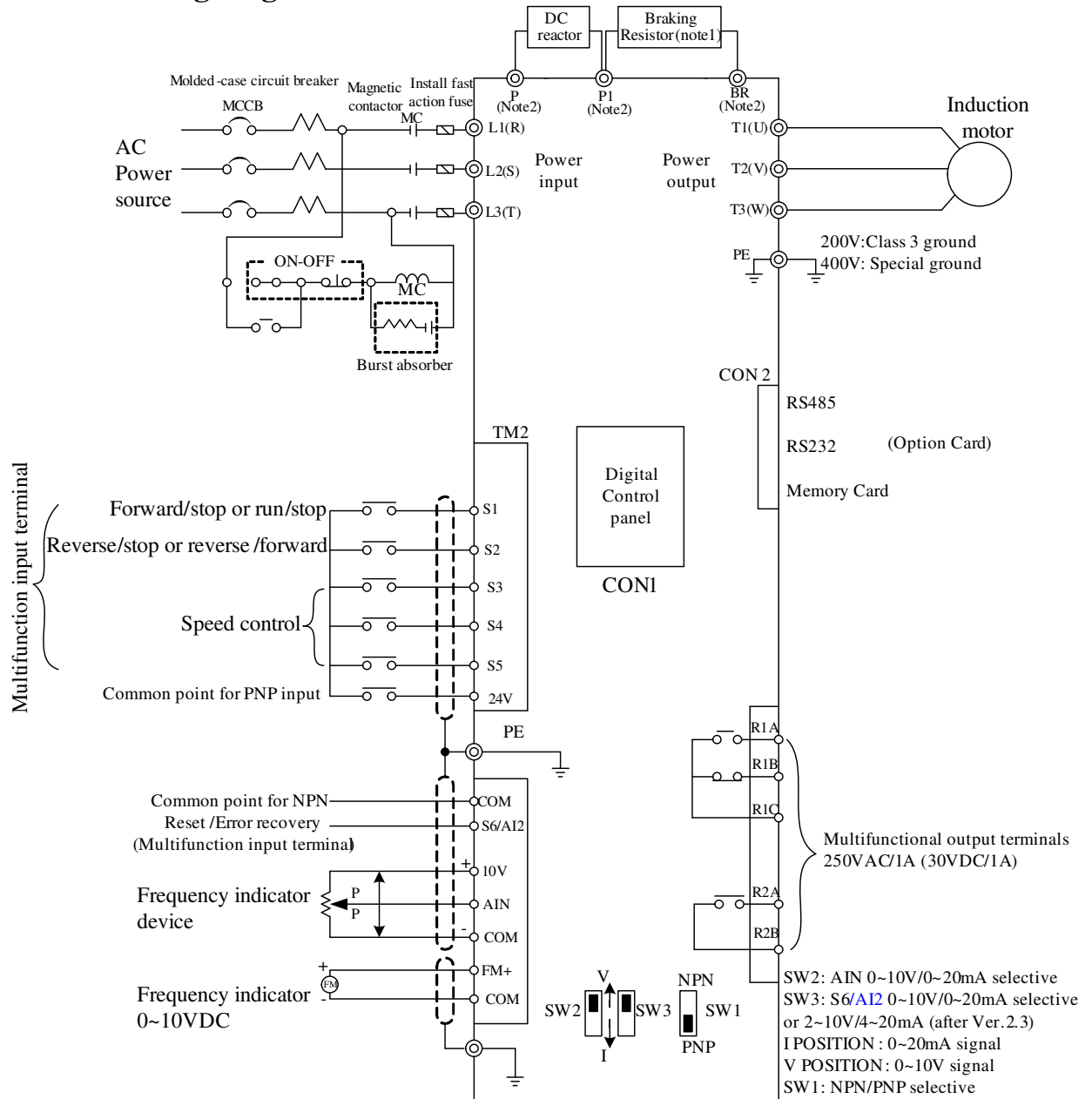
Inverter:

- Input power terminals L1, L2, and L3 can be used in any sequence regardless of phases.
- Output terminals T1, T2, and T3 are connected to U, V, and W terminals of the motor. If the motor is reversed while the inverter is forward, just swap any two terminals of T1, T2, and T3.
- To avoid damaging the inverter, do not connect the input terminals T1, T2, and T3 to AC power.
- Connect the ground terminal properly. 200 V series: class 3 grounding, $<100\Omega$; 480 V series : $<10\Omega$.



1.3 Wiring diagram RVCF series inverter

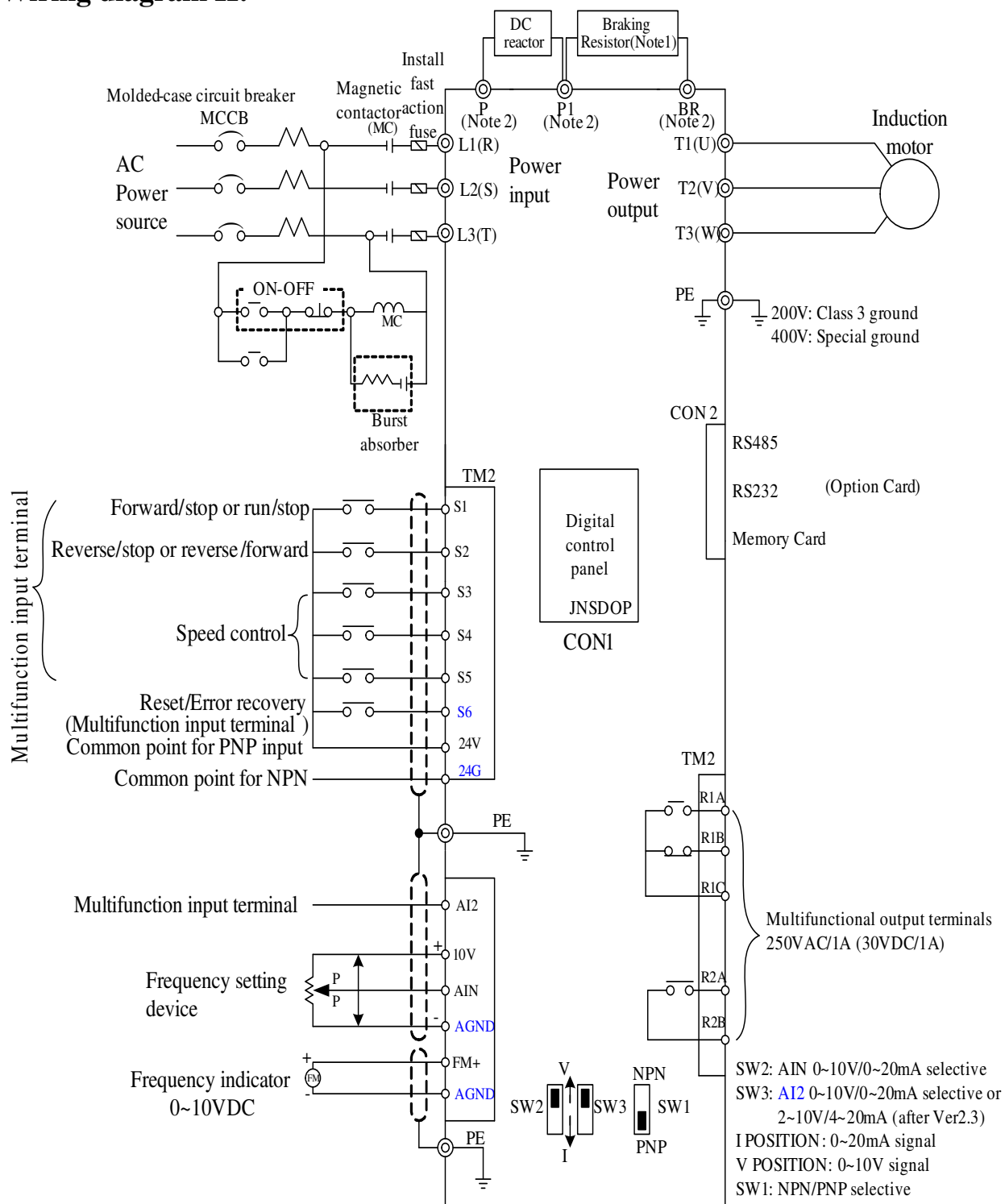
Wiring diagram I:



Note 1: Please refer to description of main circuit terminals (P1, BR) and specification of braking resistor for value selection.

Note 2: Above wiring diagram refers for 0.4~1.5KW at 230V and 0.75~1.5KW at 480V only.

Wiring diagram II:



Note 1: Please refer to description of main circuit terminals (P1, BR) and specification of braking resistor for value selection.

Note 2: Above wiring diagram refers for 2.2~7.5KW at 230V and 2.2~11KW at 480V only.

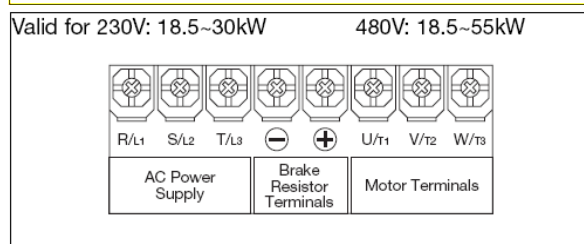
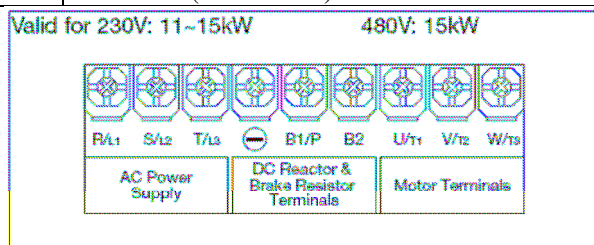
1.4 Description of inverter terminals

Descriptions of main circuit terminals

Symbol	Description	
R / L1 (L)	Main power input Single-phase: L/N Three-phase: L1/L2/L3	
S / L2		
T / L3 (N)		
P1	Braking resistor or connecting terminal: Used in cases where the inverter frequently disconnects due to large load inertia or short deceleration time (refer to specifications of braking resistor)	For 230V:0.5~10HP, 480V:1~15HP
BR		
P1/ P	DC reactor connecting terminals	
B1/P	B1/P- $\ominus$: DC power supply input B1/P-B2: External braking resistor For 230V: 15~20HP and 480V: 20HP	$\oplus$- $\ominus$: DC power supply input or External braking unit. Check Chapter 6.3 For 230V: 25~40HP and 480V: 25~75HP
B2		
$\ominus$		
$\oplus$	-	
U / T1	Inverter outputs	
V / T2		
W / T3		

Descriptions of RVCF control circuit terminals

Symbol	Description		
R2A	Multifunctional terminal – Normal open Contact rated capacity: (250VAC/1A or 30VDC/1A) Contact using description:(refer to 8-02, 8-03)		
R2B			
R1C			Multifunctional output terminals
R1B			
R1A			
10V	Frequency knob (VR) power source terminal (pin 3)		
AIN	Analog frequency signal input terminal or multifunction input terminals S7 (H level:>8V, L level:<2V, PNP only) (refer to5-06 description)		
24V	Common contact for S1~S5 (S6, S7) in PNP (Source) input. Shift to PNP position (refer to wiring diagram) of SW1 when used PNP input		
COM 24G AGND	1. Common contact and analog input /output signal for S1~S5 in NPN (Sink) input. Shift to NPN position (refer to wiring diagram I) of SW1 when used NPN input. 2. AGND for AIN,AI2 and FM+ (analog input /output signal) & 24G for S1~S6 (digital input /output signal in NPN (Sink) input). Shift to NPN position (refer to wiring diagram II) of SW1 when used NPN input.		
FM+	The positive analog output for multifunction (refer to 8-00 description), the signal for output terminal is 0-10VDC (below 2mA).		



Symbol	Function Description
S1	Multifunction input terminals(refer to 5-00 ~ 5-04 description) (S5 = Encoder input terminal, the Encoder voltage range: 19.2V~24.7V)
S2	
S3	
S4	
S5	
S6	1. Multifunction input terminals (Digital terminal H level:>8V, L level:<2V, PNP only) or analog input terminal AI2(0~10Vdc/4~20mA)(refer to 5-05 description) 2. The V2.9 version (contains) above the edition, S6 only is the Multi-function input terminal use, AI2 have replaced S6 to take analog input use. (Above wiring diagram refers for 2.2~7.5KW at 230V and 2.2~11KW at 480V only.)

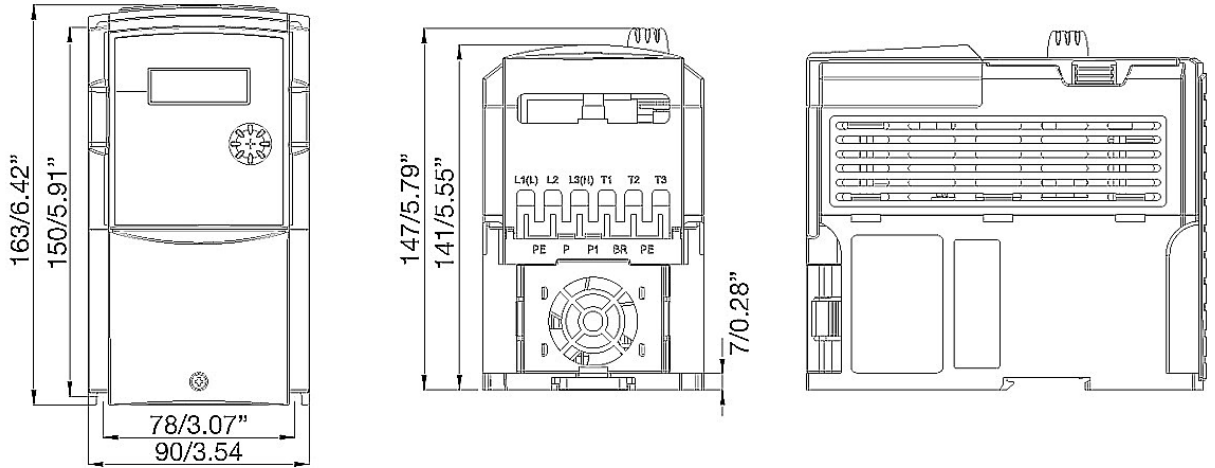
Descriptions of SW function

SW2/SW3	Type of external signal	Remarks
	0~10VDC analog signal	(1) External control is available as 1-06=0002 (2) Factory setting is voltage input
	0~20mA analog signal	

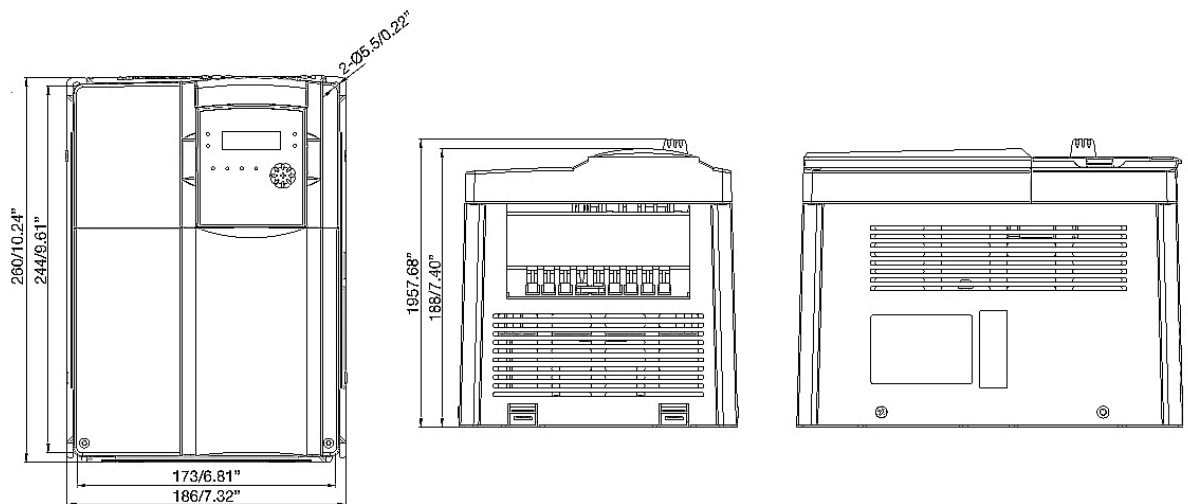
SW1	Type of external signal	Remarks
	NPN (SINK) input	
	PNP (SOURCE) input	Factory default

1.5 Outline Dimensions

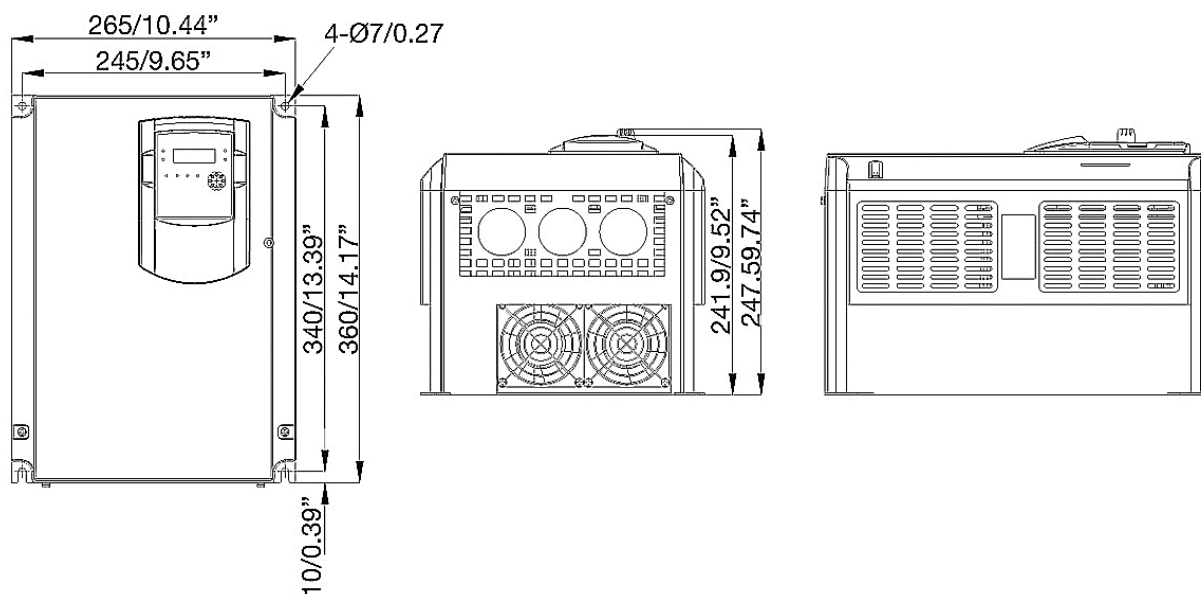
- (1) Frame1 > Single phase RVCFA1200040, RVCFA1200075
 Three phase RVCFA3200040, RVCFA3200075, RVCFA3200150,
 RVCFA3400075, RVCFA3400150
 (2) Frame2 > Single phase RVCFB1200150, RVCFB1200220
 Three phase RVCFB3200220, RVCFB3200370,
 RVCFB3400220, RVCFB3400370



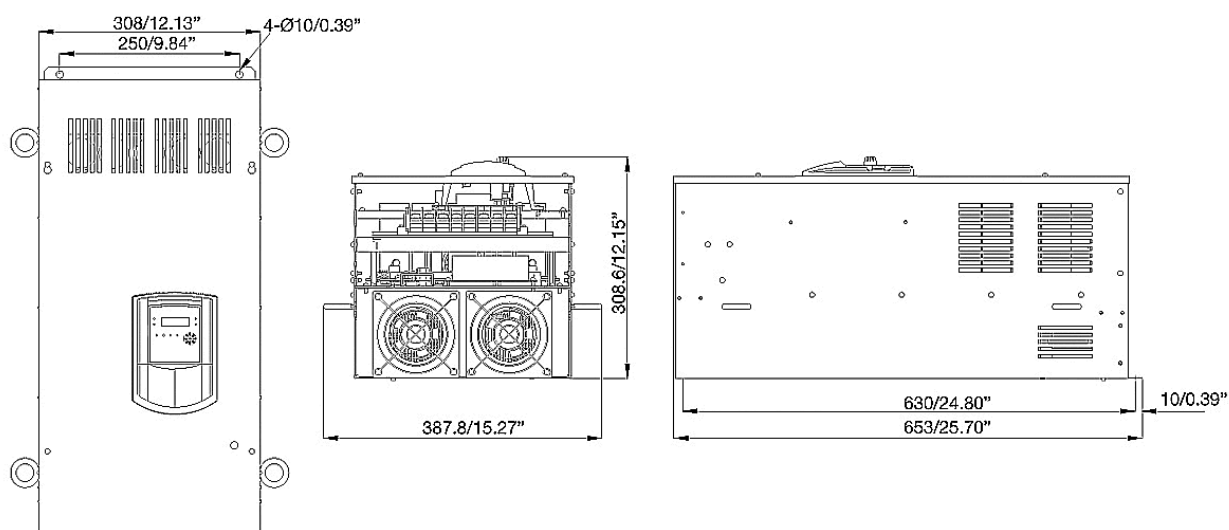
- (3) Frame3 > Three phase RVCFC3200550, RVCFC3200750
 RVCFC3400550, RVCFC3400750, RVCFB3401100



- (4) Frame4 > Three phase RVCFD3201100, RVCFD3201500, RVCFD3201850
RVCFD3401500, RVCFD3401850, RVCFD3402200



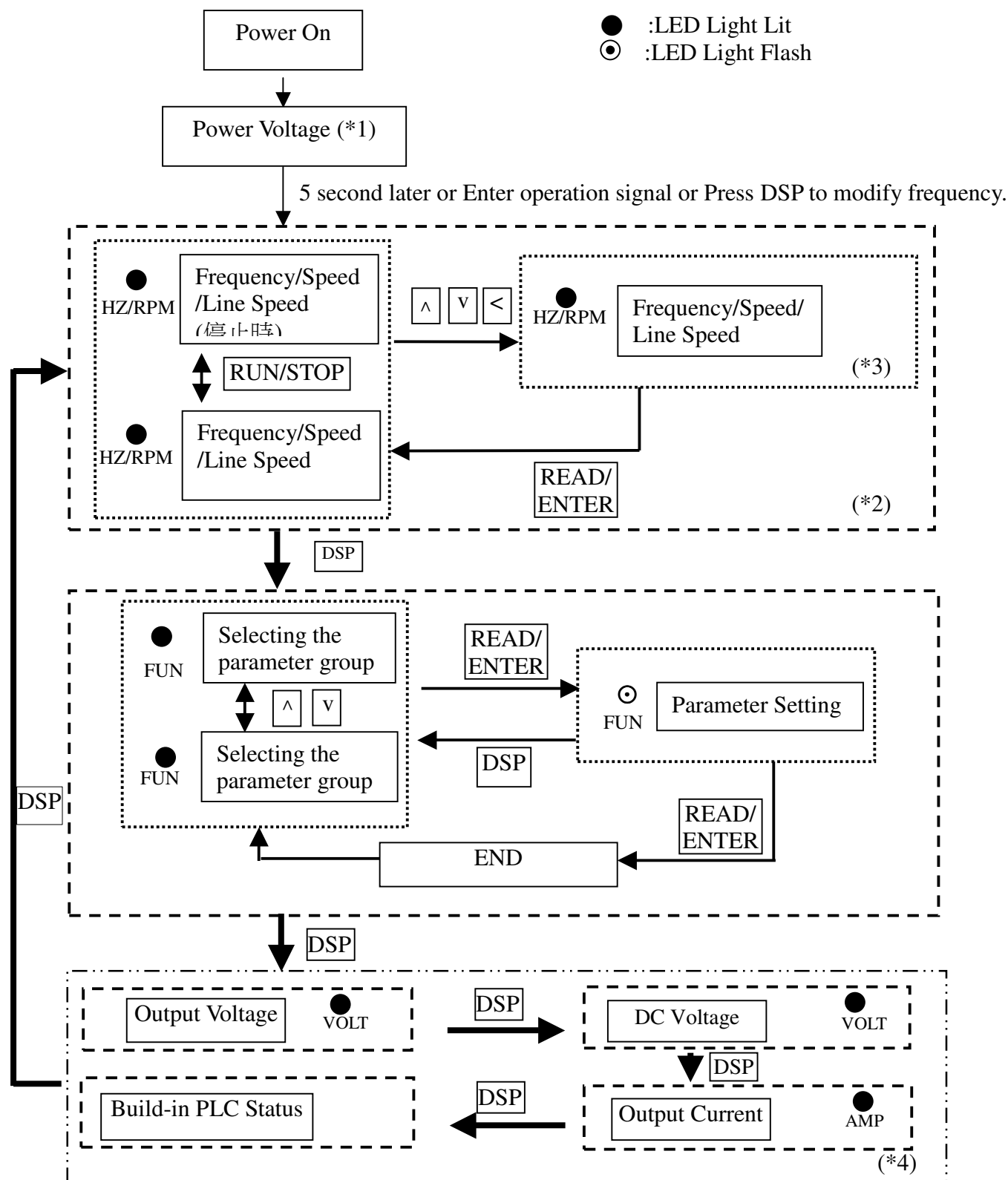
- (5) Frame5 > Three phase RVCFE3202200, RVCFE3203000
RVCFE3403000, RVCFE3403700
(6) Frame6 > Three phase RVCFF3404500, RVCFE3405500



(Open Chassis Type— IP00)

Chapter 2 Software Index

2.1 Operation Instruction of the keypad



*1: The inverter will flash the current setting of 0-07 (power supply voltage) after power up.

*2: 4-04, 4-05 determines the displaying of frequency, speed or line speed.

*3: It is not necessary to press ENTER key when stopped for modification. Refer to example 1, 2.

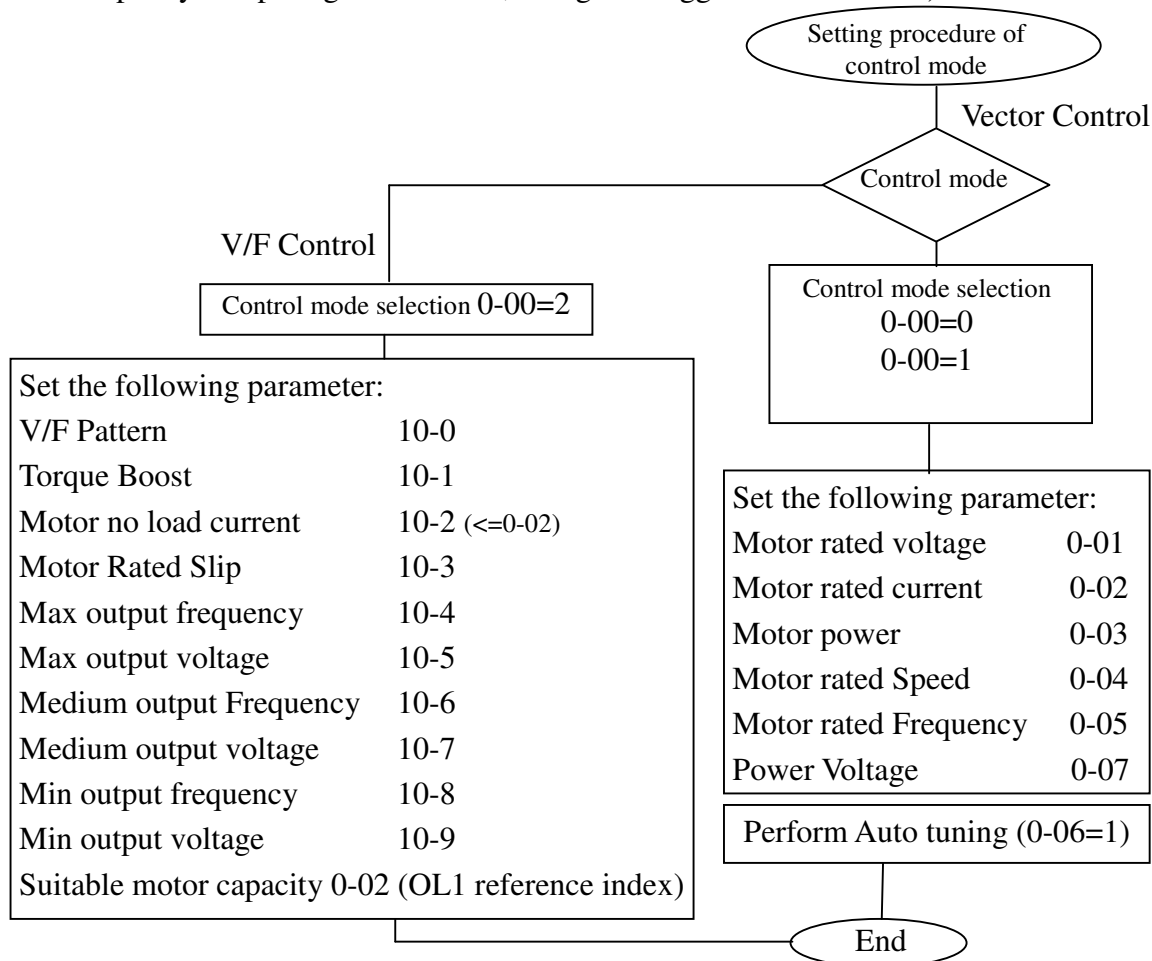
*4: Whether output current, output voltage, DC voltage, status of built-in PLC is displayed or not is determined by 4-00 ~ 4-03 respectively.

2.2 Control Mode Selection

RVCF Series inverter has three control modes:

1. General Vector Control Mode
2. VT Vector Control Mode (Special for Blower, Pump).
3. V/F Control Mode.

The user can choose these modes with the digital keypad according to the application characteristics. The factory setting is general vector control mode. Before operation, please set the control mode and the relative parameters of the motor in accordance with the following flow chart. (The Vector control mode only suits for the inverter with same capacity comparing to the motor, or a grade bigger or smaller one).



Note:

1. Use V/F Control Mode:
 - (1) Use one inverter to drive several motors simultaneously
 - (2) Motor's nameplate is unknown or motor's specifications are too special, it will cause Auto-tuning fault.
 - (3) Specification of inverter and motor differ more than 1 class.
2. One inverter drives several motors (Only V/F mode available), set the motor parameter complying with the following rules:
 - (1). As for the current, sum the rated current of all motors.
 - (2). As for others, input correct VF Pattern parameter (10-4~10-9).
3. When the nameplate of the motor is unknown, the inverter will set the internal parameter according to the standard CARLO GAVAZZI motor.
4. When parameter 0-00 does set to 2, the keypad will display 'Err2' in performing

Auto tuning.

5. In VECTOR MODE control, the max. & min. value of 0-01~0-05 will be limited by grade upper or lower than CARLO GAVAZZI standard motor specification. In VF MODE control, there is no limitation.

2.3 RVCF Programmable Functions List

Parameter Group No.	Description
0-	Drive Operation Mode
1-	Start/Stop and Frequency Control Modes
2-	Manual/Automatic Restart Modes
3-	Operating Parameters
4-	Digital Display Operation Mode
5-	Multifunction Input Terminals (MFIT)
6-	Jog, and Preset (MFIT) Speed Setting on Keypad
7-	Analog Input Signal Operation
8-	Multifunction Output Relays and Output Signal Operation
9-	Drive and Load Protection Modes
10-	Volts/Hz Pattern Operation Mode
11-	PID Operation Mode
12-	PID "Limits" and "Out of Range" Mode
13-	Communication Mode
14-	Motor Auto-Tuning Parameters
15-	Drive Status and Function Reset

0- Drive Operation Mode

Function Code No.	LCD Display	Description	Range/Code	Factory Setting	Remarks
0-00	(Control Mode)	Control Mode	0000: Vector (General Purpose) 0001: Vector (Variable Torque) 0002: Volts/Hz (Refer to Parameter Group 10- Volts/Hz Mode)	0000	*3
0-01	(Motor rated Volt)	Motor Rated Voltage (Vac)	-----		*3*5
0-02	(Motor rated Amps)	Motor Rated Current (Amp)	-----		*3*5
0-03	(Motor rated KW)	Motor Rated Power (kW)	-----		*3*5
0-04	(Motor rated RPM)	Motor Rated Speed (RPM)	-----		*3*5*7
0-05	(Motor rated Hz)	Motor Rated Frequency (Hz)	-----		*3*5
0-06	(Auto Tuning)	Motor Parameter Auto Tuning	0000: Invalid 0001: Valid	0000	
0-07	(AC Input Volt)	AC Line Input Voltage (Vac)	230V SERIES:170.0~264.0 480V SERIES:323.0~528.0		*3
0-08	(Select Language)	Language Selection	0000: English 0001: German 0002: French 0003: Italian 0004: Spanish	0000	Only for LCD keypad

1- Start/Stop and Frequency Control Modes

Function Code No.	LCD Display	Description	Range/Code	Factory Setting	Remarks
1-00	(Run Source)	Run Command Source Selection	0000: Keypad 0001: External Run/Stop Control (See 1-01) 0002: Communication 0003: Built-In PLC	0000	
1-01	(MFIT Run Mode)	Run/Stop-Forward/Reverse Operation Mode with External Terminals	0000: Forward/Stop-Reverse/Stop 0001: Run/Stop-Forward/Reverse 0002: 3-Wire Control Mode-Run/Stop	0000	
1-02	(Reverse Oper)	Prohibition of Reverse operation	0000: Enable Reverse Command 0001: Disable Reverse Command	0000	
1-03	(Keypad Stop)	Keypad Stop Button	0000: Stop Button Enabled 0001: Stop Button Disabled	0000	
1-04	(Starting Method)	Starting Method Selection	0000: Normal Start 0001: Enable Speed Search	0000	
1-05	(Stopping Method)	Stopping Method Selection	0000: Controlled Deceleration-to-Stop with DC Injection Braking (Rapid Stop) 0001: Free run Stop		

Function Code No.	LCD Display	Description	Range/Code	Factory Setting	Remarks
1-06	(Frequency Source)	Frequency Command Source Selection	0000: Keypad 0001: Potentiometer on Keypad 0002: External Analog Signal Input or Remote Potentiometer 0003: Up/Down Frequency Control Using MFIT (S1 - S6) 0004: Communication setting frequency 0005: Impulse (S5) setting frequency (ver2.3)	0000	
1-07	(Keypad Up/Down)	Keypad Operation with Up/Down Keys in Run Mode	0000: 'Enter' must be pressed after frequency change with Up/Down Keys on keypad. 0001: Frequency will be changed directly when Up/Down Keys are Pressed	0000	

2- Manual/Automatic Restart Modes

Function Code No.	LCD Display	Description	Range/Code	Factory Setting	Remarks
2-00	(PwrL Selection)	Momentary Power Loss and Restart	0000: Momentary power loss and restart disable 0001: Momentary power loss and restart enable 0002: Momentary power loss and restart enable while CPU is operating. (According to the capacity of DC power)	0000	
2-01	(PwrL Ridethru T)	Momentary Power Loss Ride-Thru Time (Seconds)	0.0 - 2.0	0.5	
2-02	(Delay of Restart)	Auto Restart Delay Time (Seconds)	0.0 - 800.0	0.0	
2-03	(Num of Restart)	Number of Auto Restart Attempts	0 - 10	0	
2-04	(Auto Restart)	Auto Restart Method	0000: Enable Speed Search 0001: Normal Start	0000	
2-05	(Direct Start Sel)	Direct Running After Power Up	0000: Enable Direct running after power up 0001: Disable Direct running after power up	0001*8	
2-06	(Delay-on Timer)	Delay-ON Timer (Seconds)	0.0-300.0	0.0	
2-07	(Reset Mode Sel)	Reset Mode Setting	0000: Enable Reset Only when Run Command is Off 0001: Enable Reset when Run Command is On or Off	0000	
2-08	(KEB Decel Time)	Kinetic Energy Back-up Deceleration Time	0.0:Disable 0.1~25.0: KEB Deceleration Time	0.0	

3- Operating Parameters

Function Code No.	LCD Display	Description	Range/Code	Factory Setting	Remarks
3-00	(Freq Upper Limit)	Frequency Upper Limit (Hz)	0.01 - 650.00	50.00 / 60.00	*4
3-01	(Freq Lower Limit)	Frequency Lower Limit (Hz)	0.00 - 650.00	0.00	
3-02	(Accel Time 1)	Acceleration Time # 1 (Seconds)	0.1 – 3600.0	10.0	*1
3-03	(Decel Time 1)	Deceleration Time # 1 (Seconds)	0.1 – 3600.0	10.0	*1
3-04	(S-Curve 1)	S-Curve Acc/Dec # 1 (Seconds)	0.0 - 4.0	0.2	
				1.0 *9	
3-05	(S-Curve 2)	S-Curve Acc/Dec # 2(Seconds)	0.0 - 4.0	0.2	
				1.0 *9	
3-06	(Accel Time 2)	Acceleration Time # 2 (MFIT) (Seconds)	0.1 – 3600.0	10.0	*1
3-07	(Decel Time 2)	Deceleration Time # 2 (MFIT) (Seconds)	0.1 – 3600.0	10.0	*1
3-08	(Jog Accel Time)	Jog Acceleration Time (MFIT) (Seconds)	0.1 - 25.5	0.5	*1
3-09	(Jog Decel Time)	Jog Deceleration Time (MFIT) (Seconds)	0.1 - 25.5	0.5	*1
3-10	(DCInj Start Freq)	DC Injection Brake Start Frequency (Hz)	0.1 - 10.0	1.5	
3-11	(DCInj Level)	DC Injection Brake Level (%)	0.0 – 20.0	5.0	*7
3-12	(DCInj Time)	DC Injection Brake Time (Seconds)	0.0 - 25.5	0.5	
3-13	(Skip Freq 1)	Skip Frequency # 1 (Hz)	0.00 - 650.00	0.0	*1
3-14	(Skip Freq 2)	Skip Frequency # 2 (Hz)	0.00 - 650.00	0.0	*1
3-15	(Skip Freq 3)	Skip Frequency # 3 (Hz)	0.00 - 650.00	0.0	*1
3-16	(Skip Bandwidth)	Skip Frequency Bandwidth(± Hz)	0.00 - 30.00	0.0	*1
3-17	(Parameter Lock)	Parameter Lock	0000: Enable all Functions 0001: 6-00 - 6-08 cannot be changed 0002: All Functions Except 6-00 - 6-08 cannot be changed 0003: Disable All Function	0000	
3-18	(ROM Pack Operate)	Copy Unit	0000: Disable 0001: Inverter to Copy Unit 0002: Copy Unit to Inverter 0003: Verify	0000	
3-19	(Fan Control)	Fan Control	0000: Auto (Depend on temp.) 0001: Operate while in RUN mode 0002: Always Run 0003: Always Stop	0000	
3-20	(Energy Save Mode)	Energy Saving Mode * ¹	0000: Disabled 0001: Controlled by MFIT at Set Frequency	0000	*6
3-21	(Energy Save Gain)	Energy Saving Gain (%) * ¹	0 - 100	80	*6
3-22	(Carrier Freq)	Carrier Frequency (kHz)	2 - 16	10	

Function Code No.	LCD Display	Description	Range/Code	Factory Setting	Remarks
3-23	(Center F of Trav)	Center Frequency (CF) of Traverse Run (%)	5.00 – 100.00	20.00	
3-24	(Amplit. of Trav)	Amplitude (A) of Traverse Run (%)	0.1 – 20.0	10.0	
3-25	(Drop of Trav)	Drop (D) of Traverse Run (%)	0.0 – 50.0	0.0	
3-26	(Acc T of Trav)	Acc Time (AT) of Traverse Run (Seconds)	0.5 – 60.0	10.0	
3-27	(Dec T of Trav)	Dec Time (DT) of Traverse Run (Seconds)	0.5 – 60.0	10.0	
3-28	(Rise Deviated)	Rise (X) Deviated Traverse (%)	0.0 – 20.0	10.0	
3-29	(Lower Deviated)	Lower (Y) Deviated Traverse (%)	0.0 – 20.0	10.0	
3-30	(Start Freq)	Start frequency (Hz)	0.0-10.0	0.0	

※ Notes: 1. Energy Saving Mode is available only under Volts/Hz Mode (0-00 = 0002).

4- Digital Display Operation Mode

Function Code No.	LCD Display	Description	Range/Code	Factory Setting	Remarks
4-00	(Motor Curr Disp)	Motor Current Display Selection	0000: Disable Motor Current Display 0001: Enable Motor Current Display	0000	*1
4-01	(Motor Volt Disp)	Motor Voltage Display Selection	0000: Disable Motor Voltage Display 0001: Enable Motor Voltage Display	0000	*1
4-02	(Bus Volt Disp)	DC Bus Voltage Display Selection	0000: Disable Bus Voltage Display 0001: Enable Bus Voltage Display	0000	*1
4-03	(PLC Status Disp)	PLC Status Display Selection	0000: Disable PLC Status Display 0001: Enable PLC Status Display	0000	*1
4-04	(Display Scaling)	Custom Units (Line Speed) Value	0 - 9999	1800	*1
4-05	(Display Units)	Custom Units (Line Speed) Display Mode	0000: Drive Output Frequency is Displayed 0001: Line Speed is Displayed in Integer (xxxx) 0002: Line Speed is Displayed with One Decimal Place (xxx.x) 0003: Line Speed is Displayed with Two Decimal Places (xx.xx) 0004: Line Speed is Displayed with Three Decimal Places (x.xxx)	0000	*1
4-06	(PID Fdbk Display)	PID Feedback Display Selection	0000: Disable PID Feedback Display 0001: Enable PID Feedback Display	0000	*1

5- Multifunction Input Terminals (MFIT)

Function Code No.	LCD Display	Description	Range/Code	Factory Setting	Remarks
5-00	(MFIT S1 Sel)	Multifunction Input Term. S1	0000: Forward/Stop Command ^{#1 (note)} 0001: Reverse/Stop Command ^{#2 (note)} 0002: Preset Speed # 1 (6-02) 0003: Preset Speed # 2 (6-03) 0004: Preset Speed # 3 (6-05)	0000	
5-01	(MFIT S2 Sel)	Multifunction Input Term. S2	0005: Jog 0006: Acc/Dec # 2 0007: Emergency Stop A Contact 0008: Base Block 0009: Speed Search	0001	
5-02	(MFIT S3 Sel)	Multifunction Input Term. S3	0010: Energy Saving 0011: Control Signal Selection 0012: Communication Selection 0013: Acc/Dec Disabled 0014: Up Command	0002	
5-03	(MFIT S4 Sel)	Multifunction Input Term. S4	0015: Down Command 0016: Master/Auxiliary Speed 0017: PID Function Disabled 0018: Reset 0019: Encoder input terminal (terminal S5)	0003	
5-04	(MFIT S5 Sel)	Multifunction Input Term. S5	0020: PID feedback signal AI2 (terminal AI2) 0021: AI2 Bias signal 1 input (terminal AI2)	0004	
5-05	(MFIT S6 Sel)	Multifunction Input Term. S6	0022: AI2 Bias signal 2 input (terminal AI2) 0023: Analog input (terminal AIN) 0024: PLC Application 0025: Traverse Run	0018	
5-06	(MFIT AIN Sel)	Multifunction Input Term. AIN	0026: Traverse run upper deviation 0027: traverse run lower deviation 0028: Power Source Detect for KEB Function 0029: Emergency Stop B Contact *7	0023	
5-07	(MFIT Scan Time)	Multifunction Input Term. S1 - S6 Signal Verification Scan Time (mSec X 4)	1 – 100	5	

Function Code No.	LCD Display	Description	Range/Code	Factory Setting	Remarks
5-08	(Stop Sel by MFIT)	Stop Mode Using MFIT	0000: When the MFITs are Programmed for Up/Down Frequency Control, the Set Frequency will remain when the Drive stops. And when the Drive stops, Up/Down Function Disabled. 0001: Up/Down is used. The preset frequency is reset to 0 Hz as the inverter stops. 0002: When the MFITs are Programmed for Up/Down Frequency Control, the Set Frequency will remain when the Drive stops. And when the Drive stops, Up/Down Function Enabled. *7	0000	
5-09	(Step Up/Down Fun)	Step of Up/Down Function (Hz)	0.00 – 5.00	0.00	
5-10	(Pulse Inp. Mult.)	Encoder Impulse Ratio	0.001 – 9.999	1.000	*7
5-11	(Ref.Source2)	Select the source of auxiliary frequency command	0 - 4	0	*7
5-12	(AI2 Function)	AI2 Function Set ^{#3 (note)}	20 / 21 / 22	20	*11

Notes: #1. To switch to Run/Stop with Function 1-01 = 0001.

#2. To switch to Forward/Reverse with Function 1-01 = 0001.

#3. For 2.2~7.5KW at 230V and 2.2~11KW at 480V only.

6- Jog, and Preset (MFIT) Frequency Setting on Keypad

Function Code No.	LCD Display	Description	Range/Code	Factory Setting	Remarks
6-00	(Keypad Freq)	Keypad Frequency (Hz)	0.00 - 650.00	5.00	*1
6-01	(Jog Freq)	Jog Frequency (Hz)	0.00 - 650.00	2.00	*1
6-02	(Preset Speed #1)	Preset Speed # 1 (Hz)	0.00 - 650.00	5.00	*1
6-03	(Preset Speed #2)	Preset Speed # 2 (Hz)	0.00 - 650.00	10.00	*1
6-04	(Preset Speed #3)	Preset Speed # 3 (Hz)	0.00 - 650.00	20.00	*1
6-05	(Preset Speed #4)	Preset Speed # 4 (Hz)	0.00 - 650.00	30.00	*1
6-06	(Preset Speed #5)	Preset Speed # 5 (Hz)	0.00 - 650.00	40.00	*1
6-07	(Preset Speed #6)	Preset Speed # 6 (Hz)	0.00 - 650.00	50.00	*1
6-08	(Preset Speed #7)	Preset Speed # 7 (Hz)	0.00 - 650.00	60.00	*1

7- Analog Input Signal Operation

Function Code No.	LCD Display	Description	Range/Code	Factory Setting	Remarks
7-00	(AIN Gain)	AIN Gain (%)	0 - 1000 ^{*10}	100	*1
7-01	(AIN Offset)	AIN Bias (%)	0 - 100	0	*1
7-02	(AIN Bias)	AIN Bias Selection	0000: Positive 0001: Negative	0000	*1
7-03	(AIN Slope)	AIN Slope	0000: Positive 0001: Negative	0000	*1
7-04	(AIN Scan Time)	AIN Signal Verification Scan Time (AIN, AI2) (mSec x 2)	1 - 100	50	
7-05	(AI2 Gain)	AI2 Gain (%)	0 - 200	100	*1

Notes: 7-00~7-04 is available when 5-06=0023 (AIN term.=Analog input)

8- Multifunction Output Relays and Output Signal Operation

Function Code No.	LCD Display	Description	Range/Code	Factory Setting	Remarks
8-00	(AO Mode Sel)	Analog Output Voltage Mode (0 - 10 VDC, Term. FM+)	0000: Output Frequency 0001: Frequency Setting 0002: Output Voltage 0003: DC Voltage 0004: Output Current 0005: PID Feedback *7	0000	*1
8-01	(AO Gain)	Analog Output Gain (%)	0 - 200	100	*1
8-02	(Relay R1 Sel)	Output Relay R1 Operation Mode	0000: Run 0001: Frequency Reached (Frequency Command) (Set Frequency $\pm$ 8-05) 0002: Set Frequency (8-04 $\pm$ 8-05) 0003: Frequency Threshold Level (> 8-04) - Frequency Reached 0004: Frequency Threshold Level (< 8-04) - Frequency Reached 0005: Over torque Threshold Level 0006: Fault 0007: Auto Restart	0006	
8-03	(Relay R2 Sel)	Output Relay R2 Operation Mode	0008: Momentary AC Power Loss 0009: Emergency Stop Mode 0010: Coast-to-Stop Mode 0011: Motor Overload Protection 0012: Drive Overload Protection 0013: PID Feedback Signal Loss 0014: PLC Operation 0015: Power On *7	0000	
8-04	(Freq Agree)	Frequency Reached (Hz) (Refer to 8-02: 0001)	0.00 - 650.00	0.00	*1
8-05	(Freq Agree width)	Frequency Reached Bandwidth ($\pm$ Hz)	0.00 - 30.00	2.00	*1

9- Drive and Load Protection Modes

Function Code No.	LCD Display	Description	Range/Code	Factory Setting	Remarks
9-00	(Trip ACC Sel)	Trip Prevention Selection During Acceleration	0000: Enable Trip Prevention During Acceleration 0001: Disable Trip Prevention During Acceleration	0000	
9-01	(Trip ACC Level)	Trip Prevention Level During Acceleration (%)	50 - 300	200 150*9	
9-02	(Trip DEC Sel)	Trip Prevention Selection During Deceleration	0000: Enable Trip Prevention During Deceleration 0001: Disable Trip Prevention During Deceleration	0000	
9-03	(Trip DEC Level)	Trip Prevention Level During Deceleration (%)	50 - 300	200 150*9	

Function Code No.	LCD Display	Description	Range/Code	Factory Setting	Remarks
9-04	(Trip RUN Sel)	Trip Prevention Selection in Run Mode	0000: Enable Trip Prevention in Run Mode 0001: Disable Trip Prevention in Run Mode	0000	
9-05	(Trip Run Level)	Trip Prevention Level In Run Mode (%)	50 - 300	200 150*9	
9-06	(Dec Sel Trip RUN)	Trip Prevention Deceleration Time Selection in Run Mode	0000: Trip Prevention Deceleration Time Set by 3-03 0001: Trip Prevention Deceleration Time Set by 9-07	0000	
9-07	(Dec Time Trip RUN)	Deceleration Time In Trip Prevention Mode (Seconds)	0.1 – 3600.0	3.0	
9-08	(Motor OL1 Sel)	Electronic Motor Overload Protection Operation Mode	0000: Enable Electronic Motor Overload Protection 0001: Disable Electronic Motor Overload Protection	0000	
9-09	(Motor type)	Motor type Selection	0000: Electronic Motor Overload Protection Set for Non-Inverter Duty Motor 0001: Electronic Motor Overload Protection Set for Inverter Duty Motor	0000	
9-10	(Motor OL1 Curve)	Motor Overload Protection Curve Selection	0000: Constant Torque (OL =103 %) (150 % for 1 Minute) 0001: Variable Torque (OL = 113 %) (123 % for 1 Minute)	0000	
9-11	(Motor OL1 Operat)	Operation After Overload Protection is Activated	0000: Coast-to-Stop After Overload Protection is Activated 0001: Drive Will Not Trip when Overload Protection is Activated (OL1)	0000	
9-12	(Torq Det Sel)	Over torque Detection Selection	0000: Disable Over torque Operation 0001: Enable Over torque Operation Only if at Set Frequency 0002: Enable Over torque Operation while the Drive is in Run Mode	0000	
9-13	(Torq Det Operat)	Operation After Over torque Detection is Activated	0000: Drive will Continue to Operate After Over torque is Activated 0001: Coast-to-Stop After Over torque is Activated	0000	
9-14	(Torq Det Level)	Over torque Threshold Level. (%)	30 - 200	160	
9-15	(Torq Det Delay)	Over torque Activation Delay Time (Seconds)	0.0 - 25.0	0.1	

10- Volts/Hz Operation Mode

Function Code No.	LCD Display	Description	Range/Code	Factory Setting	Remarks
10-0	(V/F Selection)	Volts/Hz Patterns	0 - 18	0/9	*4*6
10-1	(Torque Boost)	Volts/Hz Curve Modification (Torque Boost) (%)	0 – 30.0	0.0	*1*6
10-2	(Motor noLoad Amp)	Motor No Load Current (Amps AC)	-----		*5*6
10-3	(Motor rated slip)	Motor Slip Compensation (%)	0.0 – 100.0	0.0	*1*6
10-4	(Max frequency)	Maximum Frequency (Hz)	0.20 - 650.00	50.00/ 60.00	*4*6
10-5	(Max Voltage)	Maximum Frequency Voltage Ratio (%)	0.0 - 100.0	100.0	*6
10-6	(Mid frequency)	Mid Frequency (Hz)	0.10 - 650.00	25.00/ 30.00*7	*4*6
10-7	(Mid Voltage)	Mid Frequency Voltage Ratio (%)	0.0 - 100.0	50.0*7	*6
10-8	(Min frequency)	Minimum Frequency (Hz)	0.10 - 650.00	0.50/ 0.60	*6
10-9	(Min Voltage)	Minimum Frequency Voltage Ratio (%)	0.0 - 100.0	1.0*7	*6

11- PID Operation Mode

Function Code No.	LCD Display	Description	Range/Code	Factory Setting	Remarks
11-0	(PID Mode Sel)	Mode Selection	0000: Disabled 0001: Bias D Control 0002: Feedback D Control 0003: Bias D Reversed Characteristics Control 0004: Feedback D Reversed Characteristics Control 0005: Frequency Command + Bias D Control 0006: Frequency Command + Feedback D Control 0007: Frequency Command + Bias D Reversed Characteristics Control 0008: Frequency Command + Feedback D Reversed Characteristics Control	0000	
11-1	(Feedback Gain)	Feedback Gain	0.00 - 10.00	1.00	*1
11-2	(PID Gain)	Proportional Gain	0.0 - 10.0	1.0	*1
11-3	(PID I Time)	Integration Time (Seconds)	0.0 - 100.0	10.0	*1
11-4	(PID D Time)	Differentiation Time (Seconds)	0.00 - 10.00	0.00	*1
11-5	(PID Offset)	PID Offset	0000: Positive 0001: Negative	0000	*1
11-6	(PID Offset Adj)	PID Offset Adjust (%)	0 - 109	0	*1
11-7	(Output Filter T)	Output Lag Filter Time (Seconds)	0.0 - 2.5	0.0	*1

12- PID "Limits" and "Out of Range" Mode

Function Code No.	LCD Display	Description	Range/Code	Factory Setting	Remarks
12-0	(Fb Los Det Sel)	Feedback Loss Detection Mode	0000: Disabled 0001: Enabled - Drive Continues to Operate After Feedback Loss 0002: Enabled - Drive "STOPS" After Feedback Loss	0000	
12-1	(Fb Los Det Level)	Feedback Loss Detection Level (%)	0 - 100	0	
12-2	(Fb Los Det Time)	Feedback Loss Detection Delay Time (Seconds)	0.0 -25.5	1.0	
12-3	(PID I Limit)	Integration Limit Value (%)	0 - 109	100	*1
12-4	(I Time value Sel)	Integration Value Resets to Zero when Feedback Signal Equals the Intended Value	0000: Disabled 0001: 1 Second 0030: 30 Seconds	0000	
12-5	(I Error Margin)	Allowable Integration Error Margin (Units) (1 Unit = 1/8192)	0 - 100	0	
12-6	(AIN AI2 Source)	AIN or AI2 Source signal	0000: AIN=0~10V or 0~20mA AI2= 0~10V or 0~20mA 0001: AIN=0~10V or 0~20mA AI2=2~10V or 4~20mA 0002: AIN=2~10V or 4~20mA AI2=0~10V or 0~20mA 0003: AIN=2~10V or 4~20mA AI2=2~10V or 4~20mA	0000	*7
12-7	(Sleep Level)	Sleep Function Operation Level	0.00-650.00	0.0	
12-8	(Sleep Delay Time)	Sleep Function Delay Time	0.0-25.5	0.0	

13- Communication Mode

Function Code No.	LCD Display	Description	Range/Code	Factory Setting	Remarks
13-0	(Serial Comm Adr)	Assigned Communication Station Number	1 - 254	1	*2*3
13-1	(Serial Baud Rate)	Baud Rate Setting (bps)	0000: 4800 0001: 9600 0002: 19200 0003: 38400	0003	*2*3
13-2	(Comm Stop Bit)	Stop Bit Selection	0000: 1 Stop Bit 0001: 2 Stop Bits	0000	*2*3
13-3	(Comm Parity Sel)	Parity Selection	0000: Without Parity 0001: With Even Parity 0002: With Odd Parity	0000	*2*3
13-4	(Comm Data Format)	Data Format Selection	0000: 8-Bits Data 0001: 7-Bits Data	0000	*2*3

Function Code No.	LCD Display	Description	Range/Code	Factory Setting	Remarks
13-5	(Comm Err Ope Sel)	Communication time-out operation selection	0000: Deceleration to stop. (3-03: Deceleration time 1). 0001: Coast to stop. 0002: Deceleration to stop. (3-07: Deceleration time 2). 0003: continue operating.	0000	*11
13-6	(Comm Err Det Tim)	Communication time-out detection time	00.0 ~ 25.5 Sec	00.00	*11

14- Motor Auto-Tune Parameters

Function Code No.	LCD Display	Description	Range/Code	Factory Setting	Remarks
14-0	(Stator Resistor)	Stator Resistance (Ohms)	-----		*5
14-1	(Rotor Resistor)	Rotor Resistance (Ohms)	-----		*5
14-2	(Equi Inductance)	Equivalent Inductance (mH)	-----		*5
14-3	(Magnet Current)	Magnetizing Current (Amps AC)	-----		*5
14-4	(Ferrite Loss)	Ferrite Loss Conductance (gm)	-----		*5

15- Drive Status and Function Reset

Function Code No.	LCD Display	Description	Range/Code	Factory Setting	Remarks
15-0	(Drive Model)	Drive Horsepower Code	-----		*3
15-1	(Software Version)	Software Version	-----		*3
15-2	(Fault Log)	Fault Jog (Last 3 Faults)	-----		*3
15-3	(Elapsed Hours)	Accumulated Operation Time (Hours)	0 - 9999		*3
15-4	(Elapsed Hr*10000)	Accumulated Operation Time (Hours X 10000)	0 - 27		*3
15-5	(Elapsed Time Sel)	Accumulated Operation Time Mode	0000: Time Under Power 0001: Run Mode Time Only	0000	*3
15-6	(Reset Parameter)	Reset Drive to Factory Settings	1110: Reset for 50 Hz Motor Operation 1111: Reset for 60 Hz Motor Operation 1112: Reset PLC Program	0000	*4

Notes: *1 can be modified during operation

*2 cannot be modified during communication

*3 do not change while making factory setting

*4 as parameter related to factory setting

*5 the parameter will be changed by replacing model (see descriptions of the POSTSCRIPT 1)

*6 only available in V/F mode

*7 only for version 2.3 and above.

*8 only for version 2.4 and above.

*9 for 15HP of 230V class and 20HP of 480V class above

*10 only for version 2.6A and above.

*11 only for version 2.9 and above.

Chapter 3 Troubleshooting and maintenance

3.1. Error display and remedy

3.1.1. Errors which can not be recovered manually

Display	Error	Cause	Remedy
CPF	Program problem	External noise interference	Connect a parallel RC burst absorber across the magnetizing coil of the magnetic contactor that causes interference
EPR	EEPROM problem	Faulty EEPROM	Replace EEPROM
@ -OV-	Voltage too high during stop	Detection circuit malfunction	Send the inverter back for repairing
@ -LV-	Voltage too low during stop	1. Power voltage too low 2. Restraining resistor or fuse burnt out. 3. Detection circuit malfunctions	1. Check if the power voltage was correct or not 2. Replace the restraining resistor or the fuse 3. Send the inverter back for repairing
@ -OH-	The inverter is overheated during stop	1. Detection circuit malfunctions 2. Ambient temperature too high or bad ventilation	1. Send the inverter back for repairing 2. Improve ventilation conditions
CTER	Current Sensor detecting error	Current sensor error or circuit malfunctions	Send the inverter back for repairing

※ Note : “@ ” the Failure contact does not function.

3.1.2. Errors which can be recovered manually and automatically

Display	Error	Cause	Remedy
OC-S	Over current at start	1. the motor wind and enclosure short circuit 2. the motor contacts and earth short circuit 3. the IGBT module ruined	1. inspect the motor 2. inspect the wire 3. replace the transistor module
OC-D	Over-current at deceleration	The preset deceleration time is too short.	Set a longer deceleration time
OC-A	Over-current at acceleration	1. Acceleration time too short 2. The capacity of the motor higher than the capacity of the inverter 3. Short circuit between the motor coil and the shell 4. Short circuit between motor wiring and earth 5. IGBT module damaged	1. Set a longer acceleration time 2. Replace a inverter with the same capacity as that of the motor 3. Check the motor 4. Check the wiring 5. Replace the IGBT module
OC-C	Over-current at fixed speed	1. Transient load change 2. Transient power change	1. Increase the capacity of the inverter 2. Rerun parameter auto tuning (0-06 = 1) 3. Reduce stator resistance (14-0) if the above remedies are helpless
OV-C	Voltage too high during operation/ deceleration	1. Deceleration time setting too short or large load inertia 2. Power voltage varies widely	1. Set a longer deceleration time 2. Add a brake resistor or brake module 3. Add a reactor at the power input side 4. Increase inverter capacity
Err4	Illegal interrupt of CPU	Outside noise interference	Send back to repair if it happens many times
OVSP	Over speed during operating	1. Motor load too big or Inverter capacity too small 2. Motor parameter error (vector mode) 3. The gain is too big during vector mode operating 4. The Current detect circuit fault	1. Increase acceleration / deceleration time (3-02/3-03) 2. Input correct motor Parameter 3. Change stator Resistance gain and Rotator resistance gain (14-0/14-1), suggest that decrease 50~100, until 0 4. Send back to Carlo Gavazzi

3.1.3 Errors which can be recovered manually but not automatically

Display	Error	Cause	Remedy
OC	Over-current during stop	1. Detection circuit malfunctions 2. Bad connection for CT signal cable	1. Check the noise between Power line and motor line 2. Send the inverter back for repairing
OL1	Motor overload	1. Heavy load 2. Inappropriate settings of 0-02, 9-08~11	1. Increase the motor capacity 2. set 0-02, 9-08~11 properly
OL2	Inverter overload	Heavy Load	Increase the inverter capacity
OL3	Over torque	1. Heavy Load 2. Insufficient settings of 9-14, 9-15	1. Increase the inverter capacity 2. set 9-14, 9-15 properly
LV-C	Voltage too low during operation	1. Power voltage too low 2. Power voltage varies widely 3. Main Circuit Relay error	1. Improve power quality or increase the value of 2-01 2. Set a longer acceleration time 3. Increase inverter capacitor 4. Add a reactor at the power input side 5. Send the inverter back for repairing
OH-C	Heat sink temperature too High during operation	1. Heavy load 2. Ambient temperature too high or bad ventilation	1. Check if there are any problems with the load 2. Increase inverter capacity 3. Improve ventilation conditions

3.1.4 Special conditions

Display	Error	Description
STP0	Zero speed stop	Happened when preset frequency <0.1Hz
STP1	Fail to start directly	1. If the inverter is set as external terminal control mode (1-00=1) and direct start is disabled (2-04=0001), the inverter cannot be started and will flash STP1 when operation switch turned to ON after applying power (refer to descriptions of 2-04). 2. Direct start is possible when 2-04=0001.
STP2	Keypad emergency stop	1. If the inverter is set as external control mode (1-00=0001) and Stop key is enabled (1-03=0000), the inverter will stop according to the setting of 1-05 when Stop key is pressed. STP2 flashes after stop. Turn the operation switch to OFF and then ON again to restart the inverter. 2. If the inverter is in communication mode and Stop key is enabled (1-03=0000), the inverter will stop in the way set by 1-05 when Stop key is pressed during operation and then flashes STP2. The PC has to send a Stop command then a Run command to the inverter for it to be restarted. 3. Stop key cannot perform emergency stop when 1-03=0001
E.S.	External emergency stop	1. The inverter will ramp stop and then flash E.S., when input external emergency stop signal via the multifunctional input terminal (refer to descriptions of 5-00~5-06). 2. Please wiring the terminal before to set 5-00~5-06=29.
b.b.	External base block	The inverter stops immediately and then flashes b.b., when external base block is input through the multifunctional input terminal (refer to descriptions of 5-00~5-06).
ATER	Auto-tuning faults	1. Motor data error resulting in for auto-tuning failure 2. Stop the inverter emergently during Auto-tuning
PDER	PID feedback loss	PID feedback loss detect

3.1.5 Operation errors

Display	Error	Cause	Remedy
LOC	Parameter and frequency reverse already locked	1.Attempt to modify frequency /parameter while 3-17>0000 2.Attempt to reverse while 1-02=0001	1.Set 3-17=0000 2. Set 1-02=0000
Err1	Key operation error	1.Press ▲ or ▼ while 1-06>0 or running at preset speed. 2.Attempt to modify the parameter can not be modified during operation (refer to the parameter list).	1.The ▲ or ▼ is available for modifying the parameter only when 1-06=0 2.Modify the parameter while STOP
Err2	Parameter setting error	1. 3-01in the range of $3-13 \pm 3-16$ or $3-14 \pm 3-16$ or $3-15 \pm 3-16$ 2. $3-00 \leq 3-01$ 3.The setting error as performing Auto tuning(e.g. $1-00 \neq 0$, $1-06 \neq 0$)	1.Modify 3-13~3-15or 3-16 2. $3-00 > 3-01$ Set $1-00=0$, $1-06=0$ during Auto tuning
Err5	Modification of parameter is not available in communication	1.Issue a control command during communication disabled 2.Modify the function 13-1~13-4 during communication	1.Issue enable command before communication 2.Set the very parameter of the function before communication
Err6	Communication failed	1.Wiring error 2.Communication parameter setting error. 3.Sum-check error 4.Incorrect communication protocol	1.Check hardware and wiring 2.Check Function 13-1~13-4
Err7	Parameter conflict	1.Attempt to modify the function 15-0 2.Voltage and current detection circuit is abnormal	If Reset inverter is not available, please send the inverter back for repair
Err8	Factory setting error	When PLC is Running, Perform factory setting	Please perform factory setting before PLC stops.
EPr1	Parameter setting error copy unit failed	1.Set 3-18=1/2 without connecting copy unit. 2. Copy unit failed. 3.The HP rating don't match between copy unit and inverter	1.Modify 3-18 2.Replace copy unit 3.The HP rating need to be the same
EPr2	Parameter not match	Compare the parameter and inverter, and their parameter are not the same.	1.Rewrite again 2.Replace copy unit

3.2 General functional troubleshooting

Status	Checking point	Remedy
Motor can not run	Is power applied to L1(L), L2, and L3(N) terminals (is the charging indicator lit)?	• Is the power applied? • Turn the power OFF and then ON again. • Make sure the power voltage is correct. • Make sure screws are secured firmly.
	Are there voltage across the output terminal T1, T2, and T3?	• Turn the power OFF and then ON again.
	Is overload causing the motor blocked?	• Reduce the load to let the motor running.
	Are there any abnormalities in the inverter?	• See error descriptions to check wiring and correct if necessary.
	Is forward or reverse running command issued?	
	Has analog frequency signal been input?	• Is analog frequency input signal wiring correct? • Is voltage of frequency input correct?
	Is operation mode setting correct?	• Operate operations through the digital panel.
Motor runs inversely	Are wiring for output terminals T1, T2, and T3 correct?	• Wiring must match U, V, and W terminals of the motor.
	Are wiring for forward and reverse signals correct?	• Check wiring are correct if necessary.
The motor speed can not be regulated.	Are wiring for analog frequency inputs correct?	• Check wiring are correct if necessary.
	Is the setting of operation mode correct?	• Check the operation mode of the operator.
	Is the load too heavy?	• Reduce the load.
Motor running speed too high or too low	Are specifications of the motor (poles, voltage...) correct?	• Confirm the motor's specifications.
	Is the gear ratio correct?	• Confirm the gear ratio.
	Is the setting of the highest output frequency correct?	• Confirm the highest output frequency.
Motor speed varies unusually	Is the load too heavy?	• Reduce the load.
	Does the load vary largely?	• Minimize the variation of the load. • Increase capacities of the inverter and the motor.
	Is the input power lack of phase?	• Add an AC reactor at the power input side if using single-phase power. • Check wiring if using three-phase power.

Appendix 1: RVCF parameter setting list

Customer					Inverter Model		
Using Site					Contact Phone		
Address							
Parameter Code	Setting Content	Parameter Code	Setting Content	Parameter Code	Setting Content	Parameter Code	Setting Content
0-00		3-14		6-06		10-7	
0-01		3-15		6-07		10-8	
0-02		3-16		6-08		10-9	
0-03		3-17		7-00		11-0	
0-04		3-18		7-01		11-1	
0-05		3-19		7-02		11-2	
0-06		3-20		7-03		11-3	
0-07		3-21		7-04		11-4	
0-08		3-22		7-05		11-5	
1-00		3-23		8-00		11-6	
1-01		3-24		8-01		11-7	
1-02		3-25		8-02		12-0	
1-03		3-26		8-03		12-1	
1-04		3-27		8-04		12-2	
1-05		3-28		8-05		12-3	
1-06		3-29		9-00		12-4	
1-07		4-00		9-01		12-5	
2-00		4-01		9-02		12-6	
2-01		4-02		9-03		13-0	
2-02		4-03		9-04		13-1	
2-03		4-04		9-05		13-2	
2-04		4-05		9-06		13-3	
2-05		5-00		9-07		13-4	
2-06		5-01		9-08		13-5	
3-00		5-02		9-09		13-6	
3-01		5-03		9-10		14-0	
3-02		5-04		9-11		14-1	
3-03		5-05		9-12		14-2	
3-04		5-06		9-13		14-3	
3-05		5-07		9-14		14-4	
3-06		5-08		9-15		15-0	
3-07		5-09		10-0		15-1	
3-08		6-00		10-1		15-2	
3-09		6-01		10-2		15-3	
3-10		6-02		10-3		15-4	
3-11		6-03		10-4		15-5	
3-12		6-04		10-5		15-6	
3-13		6-05		10-6			

Appendix 2 : CE certificate

CARLO GAVAZZI Automation Components CARLO GAVAZZI LOGISTICS S.p.A. Administrative and directive headquarters: Via Milano 13, I - 20020 Lainate (MI) Tel.: ++39 02 93176.1, Fax ++39 02 93176.403 Internet: http://www.carlogavazzi.com	
CE Declaration of Conformity	
We, Manufacturer, CARLO GAVAZZI LOGISTICS S.p.A. , located at Via Milano,13 20020 Lainate (ITALY), declare under our own responsibility that the products here listed	
<i>RVCF series of Motor Controllers Variable Frequency AC Drives</i>	
are in conformity with	
The Low-Voltage Directive 73/23/EEC, as amended by 93/68/EEC,	
The EMC Directive 89 / 336 / EEC,	
referring to the below listed standards	
EN 61800-5-1: Adjustable speed electrical power drive systems. Safety requirements. Electrical, thermal and energy EN 61800-3: Adjustable speed electrical power drive systems. EMC requirements and specific test methods. EN 61000-6-2: Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments EN 61000-6-4: Electromagnetic compatibility (EMC). Generic standards. Emission standard for industrial environments EN 61000-3-2: Electromagnetic compatibility (EMC). Limits. Limits for harmonic current emissions (equipment input current up to and including 16 A per phase) EN 61000-3-3 Electromagnetic Compatibility (EMC). Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current less than or equal to 16 A per phase and not subject to conditional connection	
Compliance with these directives will require the application of a correct installation, maintenance and use conforming to intended purpose of the product, following the supplier's instructions and accepted rules of the art. The product must be installed and connected by skilled personnel who are authorised to be responsible for the safety of the equipment, at all times, even whilst carrying out their normal duties, and are therefore aware of, and can report, possible safety hazards.	
 CE marking	
Design and manufacturing follows the provisions of the Low Voltage Directive of the European Communities as of February 19. 1973 as changed by 93 / 68 / EEC and the EMC Directive 89 / 336 / EEC as changed by 92 / 31 / EEC and 93 / 68 / EEC.	
Manufacturer	
Place / Date : Lainate , November, 19th / 2008	
Signature :  Name : Graziano Padovan	

Appendix 3 : Approvals Table - UL Listing and CE certification Information

	CE approval	Europe	See attached certificate
	UL / cULs approval	USA & Canada	File number E319186
	RoHS	-	-

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Belluno - **ITALY**

Carlo Gavazzi Controls SpA
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